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Better Than the Brooklyn Bridge

US Asks Japan to Become Part Owner of Supercollider

US hopes for foreign financial help for building the Superconducting Super Collider (SSC) now rest on a quietly discussed proposition for Japan to become part owner of the multi-billion dollar accelerator under construction in Texas.

Discussion of the buy-in proposal is on the agenda for a visit to Tokyo in mid-October by D. Allan Bromley, Director of the White House Office of Science and Technology Policy (OSTP).

"We're going to ask them to become part owners of the accelerator," Bromley said in an interview with SGR on September 10. Referring to the proposal, which was initially presented to Japan last year, Bromley said:

"What we proposed at that time, and what we will continue to propose, is that the Japanese buy an equity position in this. It's not that we're going to ask the Japanese to come and help us build *our* accelerator." A Japanese ownership share in the SSC, Bromley said, "would mean they would then accept partial responsibility for its support on a continuing basis."

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Bromley described foreign shareholding in an American research facility as unique. He said that on the American side, the proposal "has been cleared all the way up the ladder," but that so far the Japanese have been non-committal.

The ownership plan was proposed to the Japanese in Tokyo last year by a delegation headed by W. Henson Moore, Deputy Secretary of the Department of Energy, and J. Thomas Ratchford, an Associate Director of OSTP. Congressional staff members who follow SSC affairs note that efforts to obtain foreign contributions for constructing the big machine have been openly discussed for several years, but they had not heard of the proposal for Japan to share in the ownership of the facility.

Substantial foreign financial contributions are essential to the SSC project, if adherence is to be maintained to guidelines adopted under Reagan and endorsed by the Bush Administration. To quell concerns about the SSC's financial impact on other parts of DOE's basic-science program, the guidelines stipulate that one third of the SSC's construction

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From High Drama to Pure Farce

NIH's Bungling Goes On In the Baltimore Case

The Baltimore case continues to provide a stage for the biomedical-research establishment to make a jackass of itself in full public view. Atop the marathon record of bumbling in a misconduct investigation that inconclusively stretches back to 1987, recent weeks have brought:

- A determined hunt for a news leak, demanded by the Director of the National Institutes of Health, resulting in a subpoena for Walter Gilbert, a Harvard Nobel laureate. Gilbert, one of innumerable recipients of leaked copies of NIH's confidential draft report on the Baltimore case, was fingered by an anonymous letter to NIH signed "A Friend of Science and NIH."
- The official muzzling of two self-appointed misconduct

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In Brief

Campus recruiting is down and pay scales for experienced scientists and engineers have been in the doldrums for the past year, following only small gains in 1989 and 1990, according to the latest edition of *Salaries of Scientists, Engineers and Technicians* (230 pp., $75), by the Commission on Professionals in Science and Technology (1500 Massachusetts Ave. NW, Suite 831, Washington, DC 20005; tel. 202/223-6995). The report, the standard source on R&D pay, covers virtually all sci/tech disciplines by level of experience, sex, region, etc.

The White House Science Office is gearing up for a look at a big ($500 million or so) federal R&D program that thrives virtually unnoted: the Small Business Innovation Research program, which, by statute, commands 1.25 percent of the external research funds of all but a few R&D agencies. The program, created in 1982 to assist small R&D firms, is a Congressional favorite. It has never been subjected to critical examination. Presidential Science Adviser Bromley has assigned a White House Fellow on his staff to conduct the study.

Chairman George Brown's campaign to enhance the middling status of the Science, Space, and Technology Committee in the House power game is being carried to the press. Reporters have been notified that, starting September 17, Brown, who became Chairman at the beginning of this Congress, will hold monthly press sessions on Committee affairs. His predecessors in the chair were usually available on request, but did not hold regular meetings.

. . . Federal Agent Asks Gilbert for Source of Report

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investigators, Walter Stewart and Ned Feder, of NIH, who were scheduled to discuss the Baltimore case at the recent national meeting of the American Chemical Society.

- The NIH Director's public criticism of both her Deputy and NIH's chief attorney for their role in the misconduct mess.
- From Nobel laureate David Baltimore, President of Rockefeller University, a mere three months after he officially retracted the disputed paper in the case (published in *Cell* in 1986): a letter in *Nature* that amounts to a retraction of the retraction.
- And the immobilization of NIH's Office of Scientific Integrity (OSI) while its operations are being investigated by NIH and HHS.

Examining the most recent developments one at a time: On August 26, Ronald W. Brooks, Special Agent in the Office of the Inspector General, Department of Health and Human Services (HHS), visited Walter Gilbert, a Nobel laureate, at his office in the Harvard Biological Laboratories. The agent's visit was inspired by an anonymous letter, dated August 8, to Jules Hallum, Director of the NIH Office of Scientific Integrity, with a cc to the HHS Inspector General. The visit was part of an investigation ordered by NIH Director Healy to determine the source of the leak last spring of NIH's confidential draft report on the Baltimore case. Stressing that the draft report was confidential, and subject to revision, Healy has several times expressed outrage at the leaks and vowed to find the culprit and plug the leaks—perhaps the most futile of goals in this most porous of all national capitals.

The NIH draft report, which received wide press attention, concluded that data for the *Cell* paper had been faked by Thereza Imanishi-Kari, of Tufts University, and that co-author Baltimore, while not involved in the fabrication, had arrogantly brushed aside valid criticisms of the paper by a postdoc in Imanishi-Kari's lab, Margot O'Toole.

The findings were a shock in the many sectors of the scientific establishment that venerate Baltimore and consider him a victim of scientific pygmies and their political friends.

On the other side, many other scientists, including prominent, accomplished figures in the community, have publicly expressed contempt for Baltimore's performance in the long-running affair. Gilbert has been openly critical of Baltimore, but has not joined others in publishing his views on the case. No matter. The sides are set in this dispute, and the bitterness of the factions has induced highly uncollegial behavior.

The anonymous letter that brought agent Brooks to scientist Gilbert stated, "It has come to my attention that you are trying to track down the source of the unfortunate leak of the OSI draft report on the Imanishi-Kari case. If you are serious about this endeavor, you should ask Professor Walter Gilbert . . . how he came to receive a fax transmission of this report within minutes of its availability and why he chose to circulate copies of that report to many members of the Harvard faculty." The letter added, "Since Dr. Gilbert has been widely quoted as being outraged by any breach of ethics or appearance of impropriety in science, he will undoubtedly be anxious to cooperate with you in this investigation."

In a telephone interview with SGR, Gilbert said the agent asked if he had a copy of the draft report. "I said, 'yes,' and he asked me where I got it." Gilbert said he refused to reply, and the agent left, returning the next day with a subpoena directing Gilbert to appear August 30 at the Boston office of the HHS Inspector General "in connection with possible improper release of an Office of Scientific Integrity (OSI) draft report regarding potential scientific misconduct by Dr. Imanishi-Kari."

Gilbert says he then telephoned the source of his copy of the report—Walter Stewart, of NIH, "and I asked him if I could reveal him as the source. Walt said, 'Okay,' " Gilbert told SGR, "and I called the Inspector General and he came the next day and I gave him the paper."

Stewart, in tandem with a fellow NIH staff member, Ned Feder, occupies a peculiar role in the sufferings of NIH and the misconduct issue. Neither is on the staff of the NIH Office of Scientific Integrity, and, in fact, their relations with OSI are close to non-existent. But under NIH's approved work plan for Feder as chief of their section, they graduated from laboratory studies of snails and are officially authorized to study "professional practices among scientists, professional misconduct, and the accuracy of the scientific literature." In a sense, they are an officially approved, self-contained guerilla cell focused on scientific misconduct. They conduct research on misconduct, lecture on it a good deal, and occasionally publish on the subject.

Though despised by many of their NIH co-workers as idlers and troublemakers, they are a substantial and respected presence in the field of misconduct studies, both

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. . . Stewart Denied Permission to Talk at Meeting

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among other students of the subject and aspiring and accomplished "whistle-blowers." Their position in the field is enhanced by a close relationship with the staff of the House Energy and Commerce Subcommittee on Oversight and Investigations, chaired by Rep. John Dingell (D-Mich.), who holds a low opinion of the state of scientific integrity and NIH's willingness to police it.

Without connections to OSI, how was Stewart able to provide Gilbert a copy of the confidential draft report? It was very simple and perfectly above board, Stewart explains. Gilbert's interest in obtaining a copy of the report came up in a conversation "about a week or two after the report was leaked and widely available." Contrary to the anonymous letter's reference to a fax transmission of the report "within minutes of its availability," Stewart said, he mailed Gilbert a copy of one of the many copies floating around Washington. Stewart insists that he did not obtain the report from OSI and no one there leaked it to him.

On August 30, three days after Gilbert gave his copy of the report to the Inspector General's agent, Congressman Dingell sent an outraged letter to HHS Secretary Louis Sullivan, denouncing the subpoena as "a shoddy attempt to intimidate and silence critics of the way major research institutions have handled scientific misconduct cases."

Dingell, whose default setting is seething outrage, noted that at a hearing in August, "Relevant NIH officials testified under oath that there was no evidence whatsoever that any leaks of draft misconduct reports had come from the OSI."

He continued: "We further understand that there is no legal constraint on anyone *outside* the NIH from releasing a draft report, and presumably no prohibition on anyone disseminating a draft report after it has been released." Dingell's letter noted that the Inspector General had assured his staff "that this investigation has been terminated."

At about the same time, the Baltimore case figured on another front, this one involving Stewart's scheduled participation August 27 in a symposium on "Whistle-blowers, Advocates, and the Law" at the 202d American Chemical Society (ACS) National Meeting, in New York. His paper, bearing the bland title "The Baltimore Fiasco: A Case Study in Fraud," was described in an abstract as providing "An up-to-date recounting of a case of fraud and the notorious attempt to cover it up involving some of the most prestigious universities in the country. The startling response of the scientific community as the scandal unfolded will be discussed."

According to a report in the ACS weekly *Chemical & Engineering News*, a lawyer representing Baltimore approached the ACS "expressing concern over the Stewart paper. ACS responded that it would not prevent its presentation." The organizer of the symposium agreed to read a disclaimer stating that the views expressed were not necessarily those of the ACS.

Foiled in that attempt, the Baltimore camp then turned to the NIH administrative process: To attend the meeting, Stewart needed the approval of higher-ups at NIH. The attorney for Baltimore appealed to NIH and its administrative umbrella, the Public Health Service (PHS), demanding that Stewart be prevented from delivering the paper. On August 26, the day before the symposium, a decision to muzzle Stewart was issued by Audrey F. Manley, the Principal Deputy Assistant Secretary for Health, who was serving as Acting Assistant Secretary. "I have decided," she stated, "based upon discussions with PHS Office of General Counsel that it would be inappropriate for an NIH employe to discuss a pending case in the Office of Scientific Integrity while it is under investigation."

The freedom-of-speech implications of this fiat were understandable even in the upper echelons of the Department. But it took a while. In the mill at the time of the ACS meeting was a request by Stewart to deliver a talk on the Baltimore case at Temple University at noon on September 5. For this occasion, he dropped the title of the ACS talk, replacing it with "The Importance of Open Discussion of Scientific Misconduct." Shortly before 6 pm on the day before the Temple meeting, Stewart was granted permission to deliver the talk.

Throughout the long controversy, Baltimore has displayed a talent for facile maneuvering, playing to the press, and recasting the basic issues to his advantage. At the outset, when Congressman Dingell championed whistle-blower O'Toole, Baltimore and his friends successfully misrepresented Dingell as a McCarthyite enemy of science and O'Toole as a confused scientific novice. But it was difficult to sell this line after the OSI draft report was leaked. Relying in large part on damning forensic analysis by the Secret Service, the draft report stated that Imanishi-Kari had fabricated lab notes to cover up failed or non-existent experiments. In response, Baltimore published a touching statement of contrition in the May 9 *Nature*.

"I now recognize," he wrote, "that I was too willing to accept Imanishi-Kari's explanations, and to excuse discrepancies as mere sloppiness. Further, I did too little to seek an independent verification of her data and conclusions. . . . I am shocked and saddened by the revelations of possible alteration and fabrication of data." He added that "I have tremendous respect for O'Toole, personally and as a scientist. . . " A few weeks later, he and four co-authors (though not Imanishi-Kari) published a retraction in *Cell*, attributing it to "questions raised about the validity of certain data in the paper."

Though the case at last seemed to be nearing a conclusion, Baltimore and company launched a new counterattack, this one riding the contention that the NIH investigative procedures were deficient in due process. Whether or not that's the case will almost surely come to court someday, but

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. . . Assailed by Other Scientists, Baltimore Hits Back

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there is no doubt that, fairly or not, OSI's investigators documented a blatant commission of scientific fraud by Imanishi-Kari. However, by pounding on the due process issue—though never clearly defining it in the context of the NIH grant system—the friends of David Baltimore once against spread heavy smoke around the commission of the most serious sin in research. And when Bernadine Healy came on board as Director at NIH in April, she had already flunked OSI on due process and control of leaks.

With the issues thus wondrously muddled, Baltimore, in a letter in the September 5 *Nature*, reverted to the old arguments about unfairness while also advancing to new ground. He did so in responding to a letter of July 18 by Paul Doty, of Harvard, who accused Baltimore of "egregious departure from the usual standards of carrying out and reporting research." Baltimore replied that "your verdicts are . . . based on mainly unsubstantiated, and often refuted, allegations of one participant in events five years old." The "participant," of course, is O'Toole, for whom Baltimore only a few months earlier had expressed "tremendous respect . . . personally and as a scientist."

In his reply to Doty, Baltimore then proceeded to defend the *Cell* paper, describing it as having been produced "with rigor and criticality." He asserted that "the data have proved more durable than the data in most papers"—which is perhaps a very modest claim. And he added "there is much published evidence and more coming that support the paper's results in remarkable detail."

Knowledgeable scientists among Baltimore's detractors contend that the claims of replication, past and coming, are nonsense. But the essential point is that the findings stated in the *Cell* paper could be both scientifically valid *and* fabricated for the occasion by Imanishi-Kari. She is not accused of erroneous findings. Rather, she is accused of not conducting the experiments she said she conducted. Baltimore has not addressed that crucial difference.

In any case, NIH's management of scientific misconduct is in a deep freeze, while, at Director Healy's request, OSI's operations and procedures are being investigated by a team from NIH and one from HHS. Healy stands aloof from all this, having recused herself from anything to do with OSI, pending OSI's resolution of a misconduct inquiry that she admits having bungled at the Cleveland Clinic, where she formerly was head of research.

Meanwhile, the Baltimore case and another blockbuster on the OSI agenda, involving Robert Gallo's role in the identification of the AIDS virus, are stalled. The staff person who had shepherded them from their longago starts, Suzanne Hadley, dropped out after the NIH Director raised insulting questions about her frequent telephone conversations with O'Toole. There is now speculation that Rep. Dingell may request Hadley's temporary assignment to his Subcommittee to work on the cases.

In a report of an interview with Director Healy in the September 6 *Science*, she is described as "outspoken in her criticism" of NIH Deputy Director William Raub "for the way he handled the Gallo and Baltimore cases before she took over as Director." The article adds that Healy "criticized NIH general counsel Robert Lanman for the heavy handed way he went about determining whether Hadley had become too close to Baltimore case whistle-blower Margot O'Toole." Comity is not in abundance in Building 1 on the Bethesda campus.

The appallingly long record of missteps and pratfalls suggests that NIH is incapable of consistent, effective management of the misconduct issue. The NIH culture gags on the concept of crooked science, preferring to believe it can be explained away. The Baltimore case, a relatively simple matter as far as the basic facts are concerned, was initially investigated by NIH in May 1987. The case is still not settled, nor is a conclusion in sight.

But there is a simple solution to the problem of NIH and its ineptitude in dealing with misconduct. NIH and its sister agency, the National Science Foundation, each manage a similar number of external grants—about 19,000 apiece at any one time. And their misconduct loads are approximately the same size—ranging from 50 to 70. But while NIH stumbles all over the scientific landscape in trying to manage its cases, the NSF operation apparently proceeds smoothly, without visible upheavals.

In a quest for the difference, SGR spoke to Linda Sundro, the NSF Inspector General, who is responsible for investigating scientific misconduct for the Foundation. The difference is simple, she contends. NIH, employing what it calls the "scientific model," relies almost exclusively on scientists to investigate and judge scientific misconduct. When NSF deals with a misconduct case, she said, it sends in a team that includes a lawyer, a scientist, and an investigator. Contact with the institution in a case is established through its office of general counsel, and the rules, rights, and responsibilities are agreed upon in advance.

Whether it's actually as sweet and simple as that is difficult to know from the outside. But it is noteworthy that so far NSF is publicly unscarred by its handling of the misconduct issue.

That being so, NIH's Dr. Healy should opt for the easy way out. Many federal agencies provide services for other agencies on a contractual basis. For example, the Navy manages logistics for NSF's Antarctic research program, while HHS monitors nuclear pollution for the Department of Energy.

In that same fashion, NIH should contract its police role to the seemingly efficient service at the National Science Foundation. And then all hands at Bethesda could get back to their real work.—DSG

. . . Bromley Says Japanese Funds Crucial for SSC

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funds must be provided by non-federal sources and that the costs of the SSC will not impinge on DOE's basic-science program.

On the basis of the latest DOE estimate, the SSC's price tag stands at $8.2 billion, though SSC critics insist that the figure is unrealistically low [SGR May 15: "Hearing Assails SSC's Empty Promises, Rising Costs"]. Proceeding with the $8.2-billion estimate, a $1-billion sweetener from the State of Texas still leaves a shortfall of about $1.7 billion in meeting the requirement for the non-federal share.

In his interview with SGR, Bromley referred to the foreign-fund requirement as "$1.7 billion to $2 billion." He acknowledged that foreign fund-raising attempts for the SSC have produced no cash or commitments so far, apart from $50 million in engineering services from India. But he said he refuses to believe that major contributions will not be forthcoming.

"I'm not prepared to accept that just yet," he said. "I'm heading off to Japan in October and the President is going in November. And we're going to give it a real college try."

Bromley added that he hoped Japanese sentiments would be swayed by the strong financial support that Congress has given the project. "The Japanese are still waiting to be convinced that we are really serious about [building the SSC]. I think the action in the House and Senate provides the base for that certainty. So, now it's time for us, in a really coordinated way—DOE, this office, the President, the Vice President—to really focus on the Japanese. They're the key players," he added, noting that Europe had clearly indicated that its own particle-physics plans left no spare cash for the SSC.

Asked whether rejection of the ownership plan would affect Japan's access to SSC on the customary basis of foreign users paying for experimental time, Bromley said, "No. That would completely upset all of our procedures in international utilization of major machines."

Referring to the Reagan-Bush guidelines on non-federal funds for the SSC and protection of the DOE science base, Bromley said that if foreign funds do not come, "the budget situation is going to be extremely difficult. The Congress will have to decide how it wants to address [the guideline requirements]."

What is Japan's incentive for taking an ownership share if it can count on access to the SSC on a user basis?

Bromley replied that in his forthcoming meeting in Tokyo, "The argument that I certainly will use is simply that by buying into this, they become owners, in part, of this really absolutely pioneering, forefront facility at a cost to them which will be vastly smaller than would be the case were they ever to try anything even vaguely similar on their own.

"They have user access," Bromley observed. "But here they would have management access. They would have seats on the Board of Directors, and so on. And I think that, human activities being what they are, if you own a substantial equity position, you may be slightly more equal than others when it comes to getting access."

In expressing hopes for Japanese shareholding in the SSC, Bromley repeated his earlier criticisms of the American approach to international collaboration on scientific mega-projects.

"I would like to see that we really internationalize major projects to a much greater degree than we have now," he told SGR. "If I were in a position to do the SSC over again, I would have done it that way. Up to now, with the Space Station, SSC, and other major projects, we have tended to decide within our own American scientific community, this is what we want to build. And then we do all the planning, we do all the politics, we get started, and then we say, 'Okay, why don't you come and join and help us with this?' That's not a truly international operation.

"The idea of offering an equity position is sort of the first step in moving toward something that is going to be much more international than we've had."

White House Sends Back Funds For Critical Technologies Institute

The Bush Administration is balking at a Congressional mandate to set up a Critical Technologies Institute as an appendage to the Office of Science and Technology Policy.

A pet idea of Senator Jeff Bingaman (D-NM), the Institute was written into a Defense money bill last year and $5 million was snitched from the Pentagon to cover two years. The legislation directed the Institute to identify and map the way to American preeminence in hot technologies. The Director of OSTP, D. Allan Bromley, was designated to head the Board, consisting of 10 senior government officials and 20 members from industry and other sectors.

For a time it appeared that the White House had accepted the concept and was pondering whether to operate the Institute as an on-board facility or contract it out for management by another organization.

But, after thinking it over, Bromley told SGR, he advised against accepting the gift. The identification of critical technologies, he said, is a well-attended-to pastime in Washington. He added that he had misgivings about the mix of public and private representatives on a board heavily involved with industrial and business issues. At the end of July, the Office of Management and Budget asked Congress to take back the money.

Asked how Senator Bingaman will regard the throttling of his creation, Bromley replied: "The Senator, I think, will probably not agree that this is a good idea."

Scientist Shortage? House Committee Requests Data

The murky field of science and engineering manpower projections has drawn the attention of a House investigations subcommittee, which has asked the National Science Foundation to ship over virtually all its files on the subject. The course and outcome of this exercise are unknowable at this point, but the inquiry takes place amid growing skepticism toward the official party line of impending vast shortages of sci/tech graduates.

The records request is in a dragnet letter to NSF Director Walter Massey from Rep. Howard Wolpe (D-Mich.), Chairman of the Subcommittee on Oversight and Investigations of the Science, Space, and Technology Committee.

Wolpe's request focuses on the chapter on manpower in a major NSF work, *The State of Academic Science and Engineering*, a 405-page collection of studies and analyses by the Foundation's Division of Policy Research and Analysis (PRA). Prepared at the request of then-NSF Director Erich Bloch under PRA Director Peter House, it was published last year and has served since as the basic fount of data for the shortage-coming camp.

The manpower chapter, titled "The Future Supply of Natural Scientists and Engineers," forecasts a cumulative "shortfall" of 675,000 bachelors of science graduates by 2006. It stresses that shortfall, deriving from demographics and career trends, is not necessarily the same as shortage. Official policy, however, is that shortages lie ahead.

The Congressional request covers "All documents from January 1988 to the present relating to projections by [PRA] of a 'shortfall' of scientists and engineers." It also asks NSF to "describe in detail the peer review process for data analysis produced by PRA and list the names and title of persons responsible for these evaluations."

Job Changes & Appointments

Karl Willenbrock, head of the National Science Foundation's Directorate for Scientific, Technological, and International Affairs (STIA) since fall 1989, left that post September 1 for a one-year federal-exchange appointment as a Visiting Professor of Engineering and Public Policy at Carnegie-Mellon University. The word around the Foundation is that the STIA Directorate, homebase of the troubled Division of Science Resources Studies, is to undergo a severe reorganization, perhaps to oblivion, in NSF Director Walter Massey's first big move to put his own stamp on NSF. Serving as acting head of STIA is ***Kurt Sandved***, who was Executive Officer of the Directorate for Geosciences.

Also at NSF: ***A. Nico Habermann***, Dean of the Carnegie-Mellon School of Computer Science, will come aboard October 1 as head of the Directorate for Computer and Information Science and Engineering, filling a year-long vacancy created when ***William Wulf*** went to the University of Virginia as AT&T Professor of Engineering and Applied Science. ***Joseph Bordogna***, Dean of Engineering and Applied Science, University of Pennsylvania, took over September 1 as head of NSF's Directorate for Engineering, succeeding ***John White***, who has been appointed Dean of Engineering at Georgia Tech.

David Barna, Director of Public Affairs at the US Bureau of Mines, has been appointed Director of Public Affairs at NSF, succeeding ***Alan Levitt***, who is considering other assignments. And ***Michael Fluharty***, an information officer at the National Institutes of Health, has been appointed NSF Chief of Media Relations and Public Information. He succeeds ***Jack Renirie***, who has retired after a long career at the Foundation.

Vivian H. Pinn, Chairman of Pathology, Howard University School of Medicine, has been appointed head of the Office of Research on Women's Health. In its startup phase, the Office, a politically high-visibility, fast-growth enterprise, has been headed on an acting basis by ***Ruth Kirschstein***, Director of the Institute of General Medical Sciences.

Senior Editor ***Kevin Finneran*** has been elevated to Editor of *Issues in Science and Technology*, the mostly pontificatorial but sometimes enlightening quarterly of the National Academy of Sciences, succeeding ***Steven Marcus***, who has moved to the editorship of *Technology Review*, published at MIT.

Stuart Bondurant will continue to serve as Dean of the University of North Carolina School of Medicine while filling in on an acting basis as President of the Institute of Medicine, health-policy wing of the National Academy of Sciences. The latest IOM President, ***Samuel Thier***, took office September 1 as President of Brandeis University.

Alexander Clark, Vice President for Academic Affairs at the University of Texas, Dallas, since 1974, has been appointed Director of the Cecil and Ida Green Center for the Study of Science and Society, described in a UT Dallas press release as "a new think tank on campus."

Robert Conn, Director of Plasma and Fusion Research at UCLA, has been appointed by US Energy Secretary James Watkins to chair a new 18-member departmental Fusion Energy Advisory Committee.

P. Patrick Leahy, a member of the US Geological Survey since 1974, has been appointed head of the Survey's newly established National Water Quality Assessment Program.

The thin ranks of science PhDs in Congress were enlarged by the election in June of Democrat ***John W. Olver*** to fill the seat of the late Silvio Conte, Republican of Massachusetts. Olver, who holds a PhD in chemistry from MIT, taught at the University of Massachusetts from 1961-69, and then served in the State Legislature until his election to the House, where he has been appointed to the Science, Space, and Technology Committee's Subcommittee on Technology and Competitiveness and Subcommittee on Environment.

More In Print: Artificial Heart, R&D's Economic Value

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report covers enrollments and employment by discipline, institution, sex, race, ethnicity, nationality, sources of support, etc. Fall 1989 grad enrollments, full and parttime, totaled 441,000, a three percent increase over 1988. With a six-percent increase, health was the fastest growing field, while social sciences and psychology continued as the largest science fields—17 and 10 percent of the total, respectively. Foreigners, 23 percent of all enrollments, were most heavily concentrated in engineering, computer sciences, and mathematics, accounting for at least 40 percent of enrollments in these fields. A summary version of the 1989 survey was published last October, and a summary of the 1990 survey is expected next month. The survey data are also available on diskettes and magnetic tapes.

Order from: NSF, Division of Science Resources Studies, Room L-611, 1800 G St. NW, Washington, DC 20550; tel. 202/634-6082.

The Artificial Heart: Prototypes, Policies, and Patients (available in October; $24.95, plus $3 shipping), from the Institute of Medicine (IOM), report of a study, commissioned by the National Heart, Lung, and Blood Institute, to evaluate artificial heart technology, which is described as "nearing a historic milestone"—clinical trials next year on a fully implantable, longterm "ventricular assist device." Also in the works are "total artificial hearts," expected to be ready for trials "early in the next century." Total cost per installation is estimated at $150,000-$200,000. With the potential patient load estimated at 35,000 to 70,000 a year initially and perhaps 200,000 by the year 2020, the financial implications invite attention. Carry on with the R&D, the IOM committee recommends, but also take advantage of the long startup period to develop clinical guidelines derived from trials and patient registries, and to conduct studies of cost-effectiveness, reimbursement policies, etc. A summary of the IOM study was issued in July and received a good deal of press attention.

Order from: National Academy Press, 2101 Constitution Ave. NW, Washington, DC 20418; tel. 1-800/624-6242; in Washington, DC: 334/3313.

How Federal Spending for Infrastructure and Other Public Investments Affects the Economy (101 pp., no charge), by the Congressional Budget Office (CBO), a review of economic analyses of the returns on various federal programs, with emphasis on R&D, in which federal spending is commonly assumed to be economically beneficial, CBO observes. But it notes that with a few exceptions reliable evidence is lacking. "Estimates" indicate a favorable economic return from basic and academic research, and "economic measures" show "generally high rates of return" from "some areas of applied research, such as health or agriculture," CBO says. But, in general, the economic case for R&D is not well developed. There's a paucity of studies on R&D's economic payoff, CBO adds, noting that in the fields of health and academic science and engineering research "only one comprehensive study in each area has appeared—and the study on health appeared over 10 years ago." Does the report debunk the economic case for R&D? It could be interpreted as such. But the concluding section states that "the measured economic return does not in itself offer a strong justification for most [federal R&D] spending. Instead, spending for R&D that is primarily intended to support the missions of particular federal agencies is best evaluated on the basis of its contribution to the mission (and the perceived merit of the mission itself)."

Order from: Congressional Budget Office, Publications, 2d and D Sts. SW, Washington, DC 20515; tel. 202/226-2809.

Defense Research: Protecting Sensitive Data and Materials at 10 Chemical and Biological Laboratories (GAO/NSIAD-91-57; 32 pp., no charge), by the General Accounting Office (GAO), a rare finding of satisfactory performance by federal agencies. Conducting an examination at the request of Senator John Glenn, Chairman of the Committee on Governmental Affairs, the GAO noted some laxness on logging in visitors to the labs, but concluded that "security controls and procedures were generally adequate to protect chemical and biological materials and sensitive information."

Also from GAO: ***Meeting the Aviation Challenges of the 1990s*** (GAO/RCED-91-152; 98 pp., no charge), papers by 23 specialists from Congress, the Administration, and the aviation industry, presented at a GAO-sponsored conference last November on safety, FAA organization, traffic control, airport security and capacity, and competition.

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.

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In Print: Civilian DARPA, Energy Options, R&D Pork

The publications listed are obtainable as indicated—not from SGR.

Technology and Economic Performance: Organizing the Executive Branch for a Stronger National Technology Base (58 pp., no charge), from the Carnegie Commission on Science, Technology, and Government, a prescription by a group including several major sci/tech industrial executives, calling for a recasting and enlargement of the federal R&D role to assist civilian industry. The report focuses on "generic and precompetitive" R&D, and thereby doesn't clash with the Bush Administration's abhorrence of "industrial policy"—usually defined as backing specific products or companies. Among the recommendations: more money and authority for the National Institute of Standards and Technology, transformation of the Defense Advanced Research Projects Agency into the National ARPA, and more attention to tech transfer by NASA, NIH, DOE, and NSF. Also recommended is a lead role for the White House Science Office in developing technology policy and more attention to R&D issues by the National Security Council. Chaired by the ubiquitous retired Admiral Bobby Inman, the panel that produced the report included Norman Augustine, CEO, Martin Marietta; Theodore Cooper, CEO, Upjohn; Robert Frosch, Vice President, GM; Louis Branscomb, head of the Science, Technology, and Public Policy Program, Kennedy School, Harvard, and Edward E. David Jr., a veteran of Washington science-advisory service.

Order from: Carnegie Commission on Science, Technology, and Government, 10 Waverly Place, New York, NY 10003; tel. 212/998-2150.

Energy Technology Choices: Shaping Our Future (GPO Stock No. 052-003-01251-1; 148 pp., $7.50), by the Congressional Office of Technology Assessment (OTA), appraisals of potential "energy strategies" for the US over the next 25 years, derived in large part from some 40 previous OTA energy reports (titles listed in this one). Improvements in energy efficiency "are closest to the ideal" of economy, environmental purity, and national security, says OTA, but they usually face "structural and behavioral barriers." Alternative energy sources, including nuclear and solar, "have some advantages, but none will be cheap relative to current fossil fuels," the report states. Listed are six future energy scenarios involving various mixtures of economic-growth levels, technological developments, and government policy responses.

Also from OTA: ***Exploring the Moon and Mars: Choices for the Nation*** (GPO Stock No. 052-003-01250-2; 104 pp., $5), nods politely to designs for including people on the Moon-and-Mars expedition endorsed by President Bush in 1989. But the report is mainly an assault on NASA for shortchanging the development of automation and robotics (A & R) for space exploration, a deliberate neglect that supports NASA's insistence that robots are poor substitutes for people. "Autonomous" capabilities in robots greatly extend their value for space exploration and can also contribute to the industrial economy, OTA states. They're also cheaper than people in space, OTA adds. The US has "many promising A&R technologies," the report notes, but NASA pays little attention to their potential, and is not likely to do so unless Congress intervenes.

Order from: USGPO, Superintendent of Documents, Washington, DC 20402-9325; tel. 202/783/3238.

The Technology Pork Barrel (400 pp., $16.95, paperback; $36.95 hardback), from the Brookings Institution, by Linda R. Cohen and Roger G. Noll, academics formerly at Brookings, examinations of the politics and economics of six ill-fated federal high-tech extravaganzas driven by high expectations of commercial potential: the American Supersonic Transport, the Applications Technology Satellite, the Space Shuttle, the Clinch River Breeder Reactor, synthetic fuels, and photovoltaics commercialization. The authors do not credit politics or the public with much of an attention span. The projects foundered, they conclude, on a combination of technical difficulties and fading of the crises that inspired their creation. Listing as assisting with the book are economists Jeffrey S. Banks, Susan A. Edelman, and William M. Pegram.

Order from: Brookings Institution, Publications, 1775 Massachusetts Ave. NW, Washington, DC 20036; tel. 202/797-6258.

National Institutes of Health Annual Report of International Activities (NIH No. 91-62; 218 pp., no charge), summarizes NIH's international programs, on which $112 million (1.5 percent of the NIH budget) was spent in fiscal 1990, the year covered by the report. Major expenditures: $52 million for foreign grants and contracts, $46 million for foreign scientists in the US, $2 million for US scientists abroad, and $2 million for travel.

Order from: Publications Office, Fogarty International Center, Building 31, Room B2C12, NIH, 9000 Rockville Pike, Bethesda, Md. 20892; tel. 301/496-2075.

Academic Science and Engineering: Graduate Enrollment and Support, Fall 1989 (NSF 90-324: 289 pp., no charge), from NSF's convalescing Science Resources Studies Division, which is running late in its publication schedule following several personnel upheavals: the 18th annual NSF/NIH survey of graduate enrollments and postdoc employment, in science, engineering, and health, covering academic year 1989-90 at virtually all advanced-degree institutions in the US. With tables of data spanning 1975-89, the

(Continued on Page 7)